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POSSIBLE GROUNDWATER CONTAMINATION FROM FOREST STANDS DIFFERING IN TREE SPECIES COMPOSITION

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For soils under forest use, management practice and choice of tree species has a significant influence on the quantity and quality of infiltrating rainfall. It is therefore supposed that management practices are capable of altering surface runoff, water retention and quality of drinking water. Decay of organic material from litter fall can result in the production and redistribution of potential toxic, or at least problematic, chemical substances, e.g. nitrate and chloroform.

Investigations were carried out on two forest plots within a drinking water protection area in northwestern Jutland, Denmark, located approx. 100 km NW of Aalborg. The predominant soil type in the study area is a Podsol from Aeolian deposits with a distinct texture in the range of fine grained sand. Due to a shallow water table, the lower parts of the soils often show mottling due to temporary or stagnant water logging. The two forest stands investigated represent different kinds of plantation and are dominated by pure even aged populations of Sitka spruce (*Picea sitchensis*) and Beech (*Fagus sylvatica*).

Soil samples from two profiles taken at different soil depths (0-140 cm) were used for the experiments, as well as samples from several drillings carried out with a hand auger. On the samples, different analyses were performed with respect to texture, soil organic matter content, pH, nitrate, and water repellency. Additionally, ground

penetrating radar was used to reveal the depth of the water table and other subsurface properties.

The results indicate that forest structure and tree age are amongst the variables influencing the amount of produced problematic substances through quantity and quality of produced litter. Consequently, the production and supply of potential toxic substances vary according to the stand structure of the investigated plots. Nitrate concentrations for all samples varied between 1.3-28.9 mg/l, while pH varied between 3.2-9. Although anticipated, water repellency effects could not be traced on the samples. Ground penetrating radar revealed that the surface of the groundwater table at the two forest stands varied between approx. 1.3-2.3 m below ground.

The most recent work in Denmark has resulted in a drastic cut down of the available groundwater resource by almost 40 %. The obtained results of the presented study show that the protection of the groundwater resource can not easily be managed by marking forested areas as drinking water protection areas alone. Sitka spruce has been identified as a possible pollutant with respect to nitrate leaching in the past, whereas beech has not. Thus, the results indicate that not only is the choice of tree species important, but also a profound knowledge of the interactions of leached substances with subsurface properties.